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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/519,903	SCEATS ET AL.	
	Examiner	**Art Unit**	
	MARIANNE L. PADGETT	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/31/07, 11/16/05 & 12/27/04*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 53-80* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 53-80* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/31/7, 11/16/5*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. Applicants' information disclosures on of 11/16/05 & 1/31/07 are made of record, noting that in the latter, no patent document was supplied for JP 03-263313 A, just an English abstract, hence it should have been cited under non-patent literature documents. It is noted that the literature article to Heilmann et al. is only marginally legible with footnotes & captions being virtually illegible.

It is noted that applicants added new claims 53-80 in their amendment of 2/20/2007, without any mention of where support for the new claims is to be found, however the examiner has found that claims 53-74, 75-78, 79 & 80 correspond to original claims 2-23, 25-28, 49 & 29, respectively, with the multiple dependences removed.

2. **Claims 1 & 53-80** are rejected under 35 U.S.C. **112, second** paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In **independent claim 1**, in the last two lines the phrase "for creating a functional defect in the photo-induced structure" & in lines 4-5 "for photo-inducing material changes in the substrate" are not **positive** limitations, hence do not **necessarily** require any actions or effects to take place. Further note that while the preamble is directed to "A method of writing a photo-induced structure into a... substrate", the body of the claim does not actually require any such writing to occur, partially due to the lack of positive limitations as noted above, but also since "creating" or "changes" or the like are not necessarily "writing", for these reasons the preamble is not commensurate in scope with the body of the claim, such that what scope the process claim is intended to cover (and consequently the product claim 79) is unclear.

Also with respect to independent claim 1, the **meanings** &/or **scope** of the limitations "an **irregularity** in the interference pattern" & "a **functional defect** in the photo-induced structure" (emphasis added are uncertain & unclear, such that the examiner cannot determine exactly what these limitations are supposed to encompass. Note that without proper definition, "functional defect" is a contradiction in terms, since a defect is something that is broken or undesirable, while something that is functional has a

use. Review at the specification finds the terminology "functional defect" used throughout the specification, but no definition or discussion that provides any clear meaning to the broadly claimed cryptic term "functional defect". However, "functional defect" is provided with examples, such as "extended defect", "two-dimensional defect", "three-dimensional defect", "linear defect", "dislocation defect", some of which have uses described on p. 11 or illustrated in figure is 7-12, but again are not defined, such at the examiner has no clear idea of what kind of actual structures are being formed, nor did the examiner find any clear definition nor example of what constituted an "irregularity in the interference pattern", so as to create the generic "functional defect", or any of the specifically labeled defects, such that the examiner has only the foggiest idea what applicants intends by "irregularity", nor what may constitute an irregularity in an interference pattern. While exemplary uses (p. 11) of linear defects & 2-D defects in optical gratings (i.e. Bragg gratings) indicate possible use in optical structures, the claims do not necessitate this, nor provide any way of determining what scope is intended be covered by the cryptic claim terminology. Not knowing applicants' intent for the scope of "an irregularity in the interference pattern" &/or what constitutes "functional", for purposes of examination, the examiner will consider any disruption or fault or change or interruption in a static or instantaneous interference pattern to constitute "an irregularity". Also see analogous problems in independent **claim 80**, which while relating to method limitations, one must at least be able to define what kind of irregularity one needs to control for using the control unit, to be able to defined what the control unit might encompass.

In **claim 53**, line 1 "the step of" lacks proper antecedent basis, as independent claim 1 has no "step" language, which the examiner notes was deleted in the preliminary amendment of 12/27/04, hence it would be appropriate to delete "step of" in claim 53, so that the nomenclature is consistent.

Use of **relative terms** that lack clear metes and bounds, is vague and indefinite unless provided with a clear definition or scope in the claims, or a clear definition in the specification or in relevant cited prior art. In **claim 53**, see "**adaptive**" describing "adaptive optics device", i.e. adaptive to what, or for

what, or to achieve what, etc.? Review of the specification found numerous uses & examples but no clear definition or scope (abstract; p. 2, 3rd & last paragraph; p. 3, 1st paragraph, etc.), such that exactly what types of devices applicants intend to be employing is not clear. Lacking any clear meaning, for purposes of examination, any device or object which may be used to alter any characteristic or feature or condition of any light will be considered an adaptive optic device.

In **claim 54**, the optic device is "reflective" or "transmissive" of what? While from the context, one might assume that it is some form of light, however what light, all wavelengths of light, some specific range of wavelengths, the particular wavelengths being employed by the two light beams? As presently claimed, this limitation lacks sufficient context to be meaningful with respect to any effect in the claimed process. See analogous problem in **claim 57** with respect to transmissive.

The word (or prefix) "**micro**" is a relative term that lacks clear metes and bounds in the claims & no definition was found in the specification, just use equivalent to that in the claims (i.e. p. 2, last paragraph), hence since "micro mirror" (**claim 56**) or "micro... system" (**claim 55**) indicate a relative size without clear metes and bounds, as it is unclear what size mirrors or systems are being claimed, lacking a clear definition or a clear statement on the record of what these terms do indicate if it is not a particular size range.

With respect to **claim 57**, what is a "retarder plate" or "electrically controllable ferroelectric liquid crystal retarder plates"? Mention of these terms was found on p. 3, 1st paragraph & p. 5, 3rd paragraph, but nothing to indicate what they might actually be, i.e. what's being "retarded"?

With respect to **claim 58**, which depends from independent claim 1, "**the** adaptive optics **means for** controlling the wavefront" (emphasis added) lacks proper antecedent basis, as no adaptive optics or adaptive optics means were introduced in the independent claim; and it is further noted that dependent claim 53 employs different language (i.e. "...device for..."). See an analogous antecedent problem in **claims 72 & 78**. Also, the language in **claim 58** would appear to invoke **112, 6th** paragraph, especially

considering the specification does provide examples distributed around the specification, hence is it applicants' intent to define the adaptive optics in this claim via 112, 6th paragraph mechanisms? Further note, in the last line of claim 58, "**for** creation of the interference pattern" does not **positively** require the light beams created by splitting an incoming light beam to actually be used **for** creation of the interference pattern.

Applicants' claims employ the terminology "one-dimensional", two-dimensional" & "three-dimensional" (**claims 59, 60, 61, 63 & 75**), however it must be noted anything that physically exists in the real world is three-dimensional, whether it has a dot shape, a line shape, a planar shape, an irregular 3-D shape, etc., only theoretical mathematical constructs, which don't actually exist, are correctly called 1-D or 2-D, since do matter how small thicknesses or with have a dimension. Therefore, it appears that applicants' use of one-dimensional or two-dimensional appears to lacks sufficient context to be meaningful as applied to use in this universe.

With respect to **claim 59**, what is a "transmission resonance"? What is being transmitted &/or resonated, when is it being exhibited (i.e. during the process or during the use of the product)?

In **claim 62**, what is "an extended defect"? **Extended** literally means to make some being larger or longer or greater, so does this mean that there is already a defect in the substrate and one is making it larger? Shape or structure or intent are unclear. Also see **claim 64**, which uses "extended" to describe "an extended photo-induced structure in the substrate", where it is analogously unclear how "extended" is intended to be modified the substrate structure, i.e. is it somehow being elongated or what? Analogous clarity problems with respect to "extended" as an adjective are found in **claims 67 & 68**.

In **claim 63**, what exactly does "a dislocation defect" encompass? The defect is dislocated from what or how? While figures 11 & 12 are said to illustrate some dislocation defects, exemplary illustrations are not a definition, this claim lacks sufficient context for this term to be meaningful.

In **claim 64**, "controlling a relative phase difference between the beams..." is unclear as it appears to lack sufficient context, as the beams have not been described to have any phase or phases, such that there is no necessary phase difference to control (generic light beams do not necessarily have phases); and it is uncertain when controlling to induce changes is being performed with respect to independent claim limitations, considering there is no positively necessitated "writing" occurring in the independent claim. Also, the meaning of "controlling a **velocity** of the changes in the interference pattern" (emphasis added) may be considered **ambiguous**, since in scientific usage the term "velocity" indicates a speed of movement, which would not properly apply to "changes", which the sentence structure indicates, thus might be applied to relative movement of the interference pattern as related to the "inducing a relative movement..." limitation, however if applicants are using "a velocity" as colloquial (e.g. not scientific) meaning, the intent might be the rate of changes in the interference pattern that is being controlled, which is an entirely different thing than the relative movement of the objects to which the interference pattern is being applied.

With respect **claim 68**, in order "to change the number of defects created along... structure", there already have to be defects there, however the examiner does not find any indication or context in the claim language that would have any part of the substrate being re-treated to change the number of defects already present, hence it is unclear if this limitation is intending to provide additional treatment to an already processed surface of the substrate, or if the substrate already contained defects before the claimed process was started, or if the language is inappropriate and was intended to actually to change the rate at which defects are created, etc. clear support for any amended intent should be shown.

In **claims 69-70**, the terms "a pitch" or "a contrast" are used to describe the interference pattern, however the examiner is unsure how "pitch" (e.g. slope?) would modify a light interference pattern. While "contrast" might logically relate to light intensity contrasts in the interference pattern, claim 70 would appear to make such an interpretation impossible, since for the light contrast in a light/dark

interference pattern to be controlled to zero, would require that there be no contrast, thus be no interference pattern, hence one could not perform the basic process of independent claim 1, therefore the examiner is entirely unclear as to what applicants might mean by "contrast of the interference pattern".

In **claim 71**, due to inconsistent terminology, "the exposure" lacks proper antecedent basis.

In **claim 73**, "the interference **region**" (emphasis added) lacks antecedent basis due to inconsistent terminology, which also gives rise to the question is the "focusing" creating the interference pattern or is it intended to be optimizing a pattern that has already created?

In **claim 75**, note that the language "structure **can be** written..." (emphasis added) does not employ **positive** language, thus <u>does not necessitate</u> creating the three-dimensional structure in the substrate utilizing intensity variations.

Claim 76 uses improper Markush terminology, since "selected from a group **comprising**" (emphasis added) uses **open language** such that it is unclear what else besides they specifically listed changes are encompassed by the claimed group. Also "the next technological process" both lacks any antecedent basis & must be considered an undefined or undeterminable limitation, which makes whatever susceptibility one is required to change impossible to determine.

In **claim 77**, "the polarization" lacks any antecedent basis.

3. The following is a quotation of the appropriate paragraphs of **35 U.S.C. 102** that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of **35 U.S.C. 103(a)** which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The **nonstatutory double patenting** rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. **Claim 80** is rejected under 35 U.S.C. **102(b)** as being clearly anticipated by **Mermelstein et al.** (WO 00/79345 A1).

Claims 1, 53-58, 60-62, 71-73, 77 & 79 are rejected under 35 U.S.C. **102(b)** as anticipated by <u>or</u>, in the <u>alternative</u>, under 35 U.S.C. **103(a)** as obvious over **Mermelstein et al**. (WO 00/79345 A1).

Mermelstein et al. (WO 00/79345 A1) teach an optical synthetic aperture system, employing a pulsed laser beam, which using acousto-optic modulator, such as a piezoelectric (PZT) transducer (e.g.

ferroelectric and crystal devices), splits the laser beam into multiple beams, which are directed onto a substrate controlling the intensity, phase & polarization of each beam, such that the beams overlap forming an interference pattern of light on the substrate. Various optical control processes include modulating the amplitude of the coherent radiation beam, employing mirror arrays & employing focusing elements (i.e. effects the shape of the beam), all of which are used to effect & control the interference patterns generated. Note that "micro" is a relative term that adds no clear meeting & that anything that exists is "movable", and that "movable micro mirrors" does not say how or when the mirrors are movable, and that in order to be stumbled into any apparatus they had to be moved into it, demonstrating their moveability. Mermelstein et al. teach that the synthesizer output signals can be quickly & accurately changed to modify the projected pattern, or to generate a new projected pattern, which may be considered to read on broad generic possible meanings of "creating an irregularity". These controlled interference patterns may be impinged on targets, such as a wafer coated with a photoresist (i.e. a photosensitive material). On p. 7 is taught that "Each pair of diffracted beams...interferes in the region of beam overlap 26 to form a fringe pattern 20 which travels across the region of overlap 26 at a speed proportional to the diffraction frequency between the respective tones 60. Thus the intensity at a point in the pattern 20 oscillates in intensity at the diffraction frequency of the two tones 60. The apparent contrast of the interference pattern 20 is reduced by fringe motion." Page 8 discusses that the "optical intensity of the projected pattern 20 is a function of the amplitude modulated laser output beam... Amplitude modulation results in the appearance of a stationary pattern 20 with contrast that can range between 0 % and 100% ... choice of the amplitude modulation waveform 62 is determined in part by desired contrast in the projected pattern 20... For continuous-wave (CW) lasers, the trade-off between contrast and light intensity in pattern 20 is nonlinear" (note different kind of nonlinear than in application's claim 75). Particularly see the abstract; figures 2-4 & 7; summary on ps. 2-3, esp. 2, line 24-p. 3, line 11 & 16-20; p. 5, esp. lines 1-6 & 15-25; p. 6, lines 14-24, esp. 18 & 23-24; p. 7, lines 13-18; p. 8, lines 3-20; & p. 9, esp. lines 8-12.

It is noted that whether or not the apparatus of Mermelstein et al. is employed to create what applicants intend by "an irregularity" &/or "functional defect", the apparatus is **capable** of the type of control which may quickly change the generated interference pattern, such that it clearly has the capability of creating what may reasonably be called irregularities that may produce functional defects, hence clearly reading on apparatus claim 80.

With respect to the process claims, given target 98 is suggested to be a wafer coated with a photoresist, and a photoresist being treated by a projected light pattern would have been photosensitive, <u>alternatively</u>, it would've been obvious to one of ordinary skill in the art that any <u>photoresist</u> material that was used in the taught synthetic aperture system of <u>imaging</u> that is suggested to replace the discussed photolithographic projection systems that employ imaging of a mask as discussed in the background on p. 1, lines 10-22, would have <u>reasonably been expected to employ photosensitive material</u> for the taught photoresist in order for the interference pattern projected thereon to appropriately effect, i.e. image, the photoresist. Given the teaching that the signals applied can be quickly & accurately changed to modify the projected pattern, in conjunction with the discussion of treating target 98 = wafer coated with photoresist (p. 6 & figure 7), this would appear to be creating change in the interference pattern as applied to the photoresist, thus would appear to be a possible interpretation of "creating an irregularity...", where whatever physical effect such a change creates, it is clearly desirable from the teachings, thus may be considered to read on "a functional defect...", such that the various controlling means employed in creating the interference pattern & the taught modifying of the projected pattern may be considered to read on the claimed "adaptive optics" device or means. <u>Alternatively</u>, noting that it is not clear exactly what is encompassed by the claim of "creating an irregularity in an interference pattern by controlling a wavefront on at least one of the beams for creating a functional defect in the photo-induced structure", it would alternatively have been obvious to one of ordinary skill in the art to employ the process of Mermelstein et al. with its ability to quickly change interference patterns used for imaging, for complex

imaging processes as suggested therein, which would have recently been expected to include processes that required sudden shifts in patterns that would reasonably have been expected to encompass what might be intended by "an irregularity... for creating functional defects...", since as near as can be determined by the examiner from the specification such an irregularity may just be an offset in the pattern, or any change in the regular periodic progression of the interference pattern, or the like, which may be considered reasonably suggested by Mermelstein et al.'s teaching of change.

Note that since any patterning produced is in the real physical world, it must be three-dimensional, since any physical object in the real world has three dimensions, no matter how tiny any of those dimensions might be, alternatively, if one considers any patterning or imaging effects that are all in a plane or a line (e.g. linear) & relatively thin to be two-dimensional or one-dimensional (although this is not literally true), it would've been further obvious to one of ordinary skill in the art to employ the taught process in patterning on photoresists in conventional configurations which would have been inclusive of treating planar surfaces &/or creating linear patterns, depended on particular intended products to be formed using the pattern photoresist. Note that claimed 62 is included herein as no determinable logical meaning can be found for "extended defect", hence it can only be considered with respect art as equivalent or equivalently vague as the "functional defect".

Given the above discussion with respect to the process, any products made thereby may be considered to read on product claim 79, even though exactly what structures this product claim might cover, cannot be determined by the examiner.

5. **Claims 64-70 & 78** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Mermelstein et al**. (WO 00/79345 A1), <u>or</u> alternatively further in view of **Cole et al**. (WO 96/36895).

With respect to claim 64, while **Mermelstein et al.** teach control of each individual beam intensity, phase & polarization in order to control the interference pattern & the ability of their system employing such controls to quickly & accurately modify the interference pattern 20 or generate new

interference patterns, they do not discuss relative movement between the substrate & the generated region of interference, such as illustrated in figure 3 as overlap region 26. However, it would've been obvious to one of ordinary skill in the art to employ conventional & standard procedures for treating & patterning different areas of a substrate, such as are typically employed in laser patterning & laser writing processes, both with or without masks, in order to pattern all areas of a substrate desired to be pattern, i.e. relative movement between the substrate & the laser optics in order to impinge light images in all desired areas, where options of moving just the substrate, just the light image or both are old and well-known, the latter especially for continuous substrate material to be treated, thus would have been expected to be effective for employing the process as taught by Mermelstein et al. in order to pattern a substrate surface larger than the specific overlap area, where the taught quick & accurate ability to modify the projected pattern would have been expected to be employed in order to provide specific desired patterning for a specific enduse. Note that the various control options of these dependent claims not directed to movement were noted for use in controlling interference patterns in section 4 above.

Alternatively, **Cole et al.** (abstract; figure 1; p. 2, lines 16-32; p. 3, line 6, p. 4, line 2; p. 5, lines 19-30; p. 7, line 1-p. 9, line 26) teach a process that may employ moving the substrate (e.g. photosensitive waveguide) or the optical device (e.g. phasemask) or both, during a light beam writing process in order to produce grating structures, where the movement itself combined with the phasemask can be used to create different grating structures. For example, "chirped" gratings were made by varying the relative speed of the waveguide with respect to the mask ≡ relative speed of the photosensitive substrate with respect to the phase shifted light pattern. Gratings are "apodised" by uniformly moving the substrate in one direction (i.e. scanning) & longitudinally dithering the substrate back-and-forth during the writing beam scan. It would've been further obvious to one of ordinary skill in the art to apply such movement techniques to the more generic teachings of Mermelstein et al., who have detailed descriptions on how to pattern with synthetic aperture projection systems that may be used to replace masks, but lacks discussion

on substrate handling during the use of such projection systems, however one of ordinary skill would have reasonably been expected to employ the teachings of Mermelstein et al. in continuous scan processes as set forth in Cole et al., because they are using the type of complex patterning with masks taught to be advantageously replaced by the aperture projection system, and the teachings concerning quick & accurate changes to modify the pattern projected would have been expected to be effective in this combined process, where the movements such as did the reading or speed variation to create different grating structures would appear to be independent of how the light is patterned, as long as the same kinds of movements are applied to the substrate &/or optical structures that produce the pattern.

It is further noted that the specialized grating structures discussed by Cole et al. might possibly represent what applicant intends by creating functional defects in structures, as they would appear to create changes or variations that might be considered irregularities in the interference pattern with respect to the substrate & consequent structure produced.

6. **Claim 1, 53-54, 58, 60-62, 64-65, 67-68, 71-74, 77 & 79-80** are rejected under 35 U.S.C. **102(b)** as being clearly anticipated by **Stepanov et al.** (WO 99/63371 A1).

Claims 55-56, 63 & 69 are rejected under 35 U.S.C. **102(b)** as anticipated by <u>or</u>, in the <u>alternative</u>, under 35 U.S.C. **103(a)** as obvious over **Stepanov et al.** (WO 99/63371 A1), considering **Hobbs et al**. (2001/0035991 A1) as a teaching reference with respect claims 63 & 69.

Claim 63 & 69 are alternatively rejected under 35 U.S.C. **103(a)** as being unpatentable over **Stepanov et al.** (WO 99/63371 A1), in view of **Hobbs et al**. (2001/0035991 A1).

Stepanov et al. (WO) teach writing grating structures on photosensitive waveguides using an interference pattern created by at least two beams of light (including polarized beams (fig. 4, p. 6, lines 29+)) & controlled by modulating the relative phase of the beams via electro-optic (using light transparent ADP, KD*P, BBO crystal types), magneto-optic, acousto-optic phase modulation or via mechanically driven phase modulators, which may also be used to split the beam. Using a modulator to control the

relative phase delay between beams is employed to control the positions of the maxima with in the interference pattern (e.g. adaptive optics), when writing the grating structure in the photosensitive waveguide. A series of reflective elements (e.g. adaptive optics, mirrors) may be employed in forming the beams. It is taught that "extended gratings" can be written by moving the waveguide while controlling the relative phase shift, where these gratings may comprise "chirped", "apodized" and "arbitrary" grading profiles, and that an optical electronic feedback loop may be employed to reduce noise. Stepanov et al. provide exemplary discussion of writing extended gratings structures, however at the examiner is uncertain what feature determines the label "extended", but as it appears to be applicants on terminology, it may be considered lacking any clear definitions that extended gratings read on extended structures & extended defects. Stepanov et al. discuss employing electro-optically induced phase change to make an interference pattern move along with the substrate as it moves, where further refinements may be made by applying a differential velocity between the substrate & the pattern, or through appropriate control of phase delay, so that a wavelength shift with respect to the "static case" may be obtained, teaching acceleration or appropriate control of phase delay used to produce a "chirp" grating, or "apodisation" provided by proper additional modulation of the electro-optic modulator, which alterations in the interference pattern would appear to read on applicants' claimed "an irregularity...", where the structure produced thereby definitely has a function, thus may be considered to be encompassed by the term "functional defect", since the structures are made by creating a change in the interference pattern as it is applied to the moving substrate, thus may be considered a disruption or irregularity in the original pattern. The reference also discusses producing "stitched" interference patterns, but provides no definition or illustration of what is meant by this. See the abstract; figures, esp. 1 & 3-4; summary on page 1, line 23-page 2, line 32; & page 4, line 11-page 5, line 2.

Stepanov et al. (WO) discuss moving the substrate (e.g. fiber) while maintaining all optical elements static (page 5, lines 3-14), where this embodiment allows focusing of the interfering beams

tightly onto the substrate to achieve spatial resolution reaching fundamental limits, leading to reduced phase & amplitude noise in the interference pattern, which may be additionally controlled by using a feedback loop or to improve noise properties of the interferometer substantially.

Note above discussions concerning three-dimensional & 2-dimensional also apply here. Stepanov et al. do not have any illustrations or discussions that enable the examiner to determine what relationship, if any the chirped, apodized & arbitrary grating profiles have to applicants' claimed dislocation defect, or exhibit "transmission resonance". However **Hobbs et al**. (abstract; fig. 1a-b & 7-8; [0062-63]), who discuss using interference patterns to make diffraction gratings & diffraction optics, as illustrated in figure 7, which have different pitches that are illustrated to be different separations (e.g. small, medium and large), provide a definition of "chirped" grating, stating in [0063] "...the recording of a so-called 'chirped' grating, where the spacings of the features in the recorded pattern varies in a controlled manner over the entire length of the workpiece from one edge to the opposite edge." The examiner notes that the change in separation, i.e. change in spacings between grating features, may be considered a defect that is a dislocation, since it is a removal of location from where the preceding pattern would have indicated, & it is functional since it has a desired use. It is further noted that the structure as illustrated in Hobbs et al.'s figure 7, which by their definition may be called chirped, as it has a controlled variation of pitch from small to medium to large as represented by reference numbers 90, 92 & 94, where this variation is formed by control of the angles of the impinging beams which cause the interference pattern, as illustrated in figure 7, thus is controlling variation in pitch of the structure produced, which presumably somehow would relate to "a pitch of the interference pattern". For these reasons, the Stepanov et al. (WO) disclosure of producing chirped gratings may be considered to inherently read on dislocation defects & controlling pitch of the interference pattern, <u>or</u> alternatively, given these teachings of Hobbs et al., it would've been obvious to one of ordinary skill in the art that as Stepanov et al. (WO) is making

chirped gratings, they would have made them using variations in interference patterns & structures as discussed by Hobbs et al.

Stepanov et al. (WO) employ multiple mirrors in their optics systems for controlling the interference patterns (figs. 1 & 3-4, refs #7-8, 24-25 & 36-37; p. 3, line 22; p. 6, lines 6-8; p. 7, line 8), however they do not call them "micro electronic mechanical systems (MEMS)", nor provide any size with respect to their configurations, however these are mechanical features that are part of overall systems including electro-optic modulators or the like, thus overall may be considered electronic mechanical systems, hence considering the micro in MEMS devices a relative term, this limitation may be considered read on by the disclosure of Stepanov et al. (WO), or alternatively it would've been obvious to one of ordinary skill in the art to employ such electromechanical systems as taught by this reference in sizes dependent on substrate & intended patterning thereof to be performed in a particular process, which would have been inclusive of "micro" sizes when patterning microsized substrates or be microsized patterns. Also since the mirrors used to be Stepanov et al.'s apparatus exist, they are "movable", since as claimed, it doesn't matter how or when the mirrors are movable; and as exemplary apparatus there in use to mirrors, an array of two has been employed.

The process of Stepanov et al. (WO) in teaching procedures for making chirped or apodized grating profiles clearly controls the number of effects caused by differential velocity or phase delay (i.e. considered equivalent of defects) that are produced in the extended gratings, hence may be considered to be controlling the change in the numbers of such defects with respect to the process when no differential velocity or phase delay is employed, which might be the intent of claim 68 (see above 112 clarity issue). Alternatively, by producing "chirps" &/or "apodized" features (i.e. ≡ defects), the number of defects in the substrate (e.g. waveguide) has been changed to the number of chirps, etc. produced

7. **Claim 74** is rejected under 35 U.S.C. **103(a)** as being unpatentable over **Mermelstein et al**. (WO 00/79345 A1), as applied to claims 1, 53-58, 60-62, 64-73 & 77-80 above, and further in view of **Poladian et al**. (WO 99/67664) or **Stepanov et al. (**(WO 99/63371 A1) discussed above), respectively.

Mermelstein et al. (WO) do not have any discussions with respect to feedback corrections applied to their interference pattern imaging techniques, however **Stepanov et al**. (WO) teaches employing a feedback loop to reduce noise in the interference pattern to thus improve noise properties of the process, hence it would've been obvious to one of ordinary skill in the art to apply such techniques to the interference pattern of Mermelstein et al. (WO) for the improved patterning precision it would reasonably have been expected to produce.

Alternatively, **Poladian et al.** ((WO) abstract; summary; claims), who teach using an interference pattern from two coherent beams to write a grating pattern in a photosensitive waveguide, teach a testing process to determine characteristics of initially formed portion of the grating structure, where the results of those tests are used to determine parameters & alter characteristics (e.g. spectral of subsequently written portions of the grating structure to provide improvement in desired characteristics, hence it would've been obvious at one of ordinary skill in the art, what employing the Mermelstein et al. interference imaging techniques for patterning processes such as grating structures which are seen to be written via such techniques, to employ testing procedures as taught by Poladian et al. in order to optimize or improve desired characteristics of the product being produced.

8. **Claim 56** is alternatively rejected under 35 U.S.C. **103(a)** as being unpatentable over **Stepanov et al. (**(WO 99/63371 A1) discussed above), as applied to claims 1, 53-55, 58, 60-69, 71-74 & 77, 79-80 above, and further in view of **Poladian et al**. ((WO 99/67664) discussed above).

While Stepanov et al. (WO) discusses the use of feedback systems to reduce noise, Poladian et al. (WO) provide additional discussion with respect to feedback systems providing means and motivation to employ such testing systems when producing grating structures analogous to those of Stepanov et al.

(WO), so as to optimize characteristics of the grating produced, such as spectral characteristics, not just optimization for the precision of the patterning technique itself, which would have been further obvious to employed in Stepanov et al. (WO), which would in turn provide motivation for having the ability to move the mirrors employed in producing the interference pattern, in order to employ taught feedback control for characteristics structural optimization, as illustrated in figure 1 & discussed on p. 4, lines 10-25 and p. 5, lines 1-10, etc..

9. **Claims 57, 69-70 & 78** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Stepanov et al.** (WO 99/63371 A1), as applied to claims 1, 53-56, 58, 60-69, 71-74,77 & 79-80 above as appropriate, and further in view of **Mermelstein et al**. ((WO 00/79345 A1) discussed above).

While Stepanov et al. (WO) discusses controlling relative phase differences in creating interference patterns & the movement of these patterns to create structures (e.g. gratings), they do not discuss the concepts of either pitch or contrast with respect to the interference patterns, however Mermelstein et al. as discussed above provide teachings on the importance of controlling the contrast in the interference pattern, inclusive of controlling contrasts from 0 % to 100 %, where it would've been obvious to an ordinary skill in the art to control the contrast of the interference pattern in order to control the features & characteristics of the interference pattern as it is used to expose the photosensitive substrate, as the process of Stepanov et al. also requires precise control, such that these teachings would have reasonably been considered cumulative & providing desirable means of optimization.

Also while Stepanov et al. (WO) teach a variety of modulators, such as acousto-optic or electro-optics modulators, exemplified by various transparent crystal material (p. 3, lines 32-37: ADP = potassium dihydrogen phosphate; KD*P = deuterated potassium phosphate; & BBO =dipiphenylyloxazole), the examiner found no evidence that these may be considered liquid crystal &/or ferroelectric materials, however Mermelstein et al. provides alternative examples of analogously employed acousto-optic modulators, including crystals with piezoelectric transducers, which employ

PZT, a ferroelectric material. Therefore, it would've been obvious to one of ordinary skill in the art to employ such piezoelectric transducers as acousto-optic modulators in the process of Stepanov et al., as they have been demonstrated to be desirably effective in analogous processing, thus would reasonably have been expected to effectively perform the process as taught by Stepanov et al. (WO).

10. **Claims 75-76** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Mermelstein et al**. (WO 00/79345 A1) or **Stepanov et al.** (WO 99/63371 A1), as applied to claims 1, 53-58, 60-74, & 77-80 above as appropriate, and further in view of **Neev** (6,156,030).

Alternatively, **Claims 59 & 75-76** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Mermelstein et al**. (WO 00/79345 A1) or **Stepanov et al.** (WO 99/63371 A1), as applied to claims 1, 53-58, 60-74, & 77-80 above as appropriate, and further in view of **Wawro et al.** (7,167,615 B1).

Neither of the primary references of **Mermelstein et al.** (WO) or **Stepanov et al**. (WO) discussed their photosensitive substrate material having "non-linear photosensitivity", which the examiner takes to be equivalent to nonlinear optical sensitivity, or nonlinear sensitivity to light, which means sensitivity to various nonlinear optical processes, such as multiphoton absorption. Note, the primary references also do not exclude the possibility of their photosensitive substrate having nonlinear photosensitivity, or say that their substrates do not have nonlinear photosensitivity. Furthermore, while applicants' claim 75 requires claimed photosensitive material to have "non-linear photosensitivity" to unspecified wavelengths of light under unspecified conditions, they do not require any process to be performed that **uses** any nonlinear optical processes, thus these claims do not in any way employ the nonlinear photosensitivity that is required to be present.

However, as shown by **Neev** (abstract; col. 1, lines 15-25; col. 7, lines 27-58; col. 9, line 57-col. 10, lines 33, esp. 10-14; col. 19, lines 15-25; cols. 27-28, esp. col. 27, lines 15-27 & 65-col. 28, line 7) it is known in the art of photo processing photosensitive materials (e.g. materials that absorbed &/or react to

light) for material modification (alteration such as chemical or physical changes, changes to optical properties, etc.) using lasers, such as pulsed lasers, to employ nonlinear optical effects, such as multiphoton absorption, when performing various modification processes, where use of appropriate laser parameters, such as pulse duration, pulse energy, in combination with substrate characteristics (e.g. laser light absorption) enables multiphoton absorption to play a dominant role in substrate modification processing, where it can be advantageous for the precision it enables. Therefore, it would've been obvious to one of ordinary skill in the art to employ photosensitive capable of multiphoton absorption & appropriate late source (pulse duration, energy & wavelengths) for processing via multiphoton absorption, in order to provide expected precision in optical patterning techniques due to multiphoton absorption, as it would've been expected to be an effective tool in optimizing imaging processes as discussed in either primary reference. As also may be seen by Neev, having made a material capable of photon absorption & applying a pulsed laser thereto, does not necessarily produce any nonlinear optical effects, demonstrating the meaninglessness up applicant present claim language.

Alternatively, by "photosensitive material substrate has a nonlinear photosensitivity", applicants may mean something more generic than the combination of Neev with the primary references, however Wawro et al. (abstract; col. 9, line 27-col. 10, lines 18+, esp. col. 9, lines 32 & 64-col. 10, line 6; col. 4, lines 18-67, esp. 25-37, 44-47 & 54-64), who are making resonant waveguide grating filters, that may employ photosensitive polymers or other materials, such as chalocgenide glass, which materials may be patterned by exposure to laser interference patterns, also suggests that dielectric materials from which gratings & waveguide layers may be made, include nonlinear dielectric materials, such as polymers that incorporate nonlinear materials or semiconductor materials, which teaching may be considered consistent with applicants' claim limitation for substrate material, such that it would've been obvious to one of ordinary skill in the art to employ specific materials as suggested by Wawro et al. (e.g. inclusive of nonlinear dielectric materials), for patterning the light beam interference patterns as performed in the

primary references, for creation of products thereby such as the gratings of Wawro et al., whose structures exhibit resonance transmission.

11. **Claims 1, 53-54, 57-58, 60-68, 74, 77 & 79-80** are provisionally rejected on the ground of nonstatutory **obviousness-type double patenting** as being unpatentable over claim 1-26 of copending Application No. **12/356,854**. Although the conflicting claims are not identical, they are not patentably distinct from each other because while employing different semantics & claiming limitations in different orders, the two sets of claims are directed to process & apparatus of overlapping scope, since both employ at least two light beams to create an interference pattern, that may have been created by various beam splitting procedures, both may employ relative movement both use various control means to control the properties of the light beams, such as phase or means to affect polarization, etc., and both may use feedback controls. The present application differs by employing the unclear language with respect to irregularities in the interference pattern for creating functional defects in the structure produced by the pattern in the photosensitive material, while the copending application (854) is directed to writing greeting structures specifically, where the grading structure is written with control of the various beam parameters (e.g. amplitude, period & phase properties). However, limitations copending (854), such as dependent claims 4 & 5, which require the interference pattern to be variably controlled to be different over portions of the grading structure, would appear to correspond to reasonable interpretations of irregularity & functional defect as discussed above, such that the specific procedures of the copending application are encompassed by the broader (and vague) limitations of the present application, such that the differences may be considered obvious variations in scope. With respect to the apparatus of present claim 80, note the copending apparatus claim 15 may be considered to have limitations that reasonably correspond, i.e. the present "an interference unit..." is equivalent to lines 4-6 of copending claim 15, while the president open quote a control unit..." reasonably encompasses to the limitations of copending claim

15, lines 7-13. Above discussion concerning chirped gratings reading on dislocation defects is considered applicable here.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

12. **Claims 55-56, 69-70 & 78** or **claims 75-76** or **claims 59 & 75-76** or **claim 63** are provisionally rejected on the ground of nonstatutory **obviousness-type double patenting** as being unpatentable over claims 1-26 of copending Application No. **12/356,854**, in view of **Mermelstein et al.** (WO) or **Neev**, or **Wawro et al.** (7,167,615 B1), or **Hobbs et al**., respectively, all discussed above.

While the copending application (854)'s claims do not discuss limitations concerning MEMS's, or pitch &/or contrast in interference patterns, or non-linear photosensitivity in substrate material, the usefulness of mirror systems consistent with those claimed, or the importance of considering controlling contrast in light interference patterns, were shown as discussed above with respect to employing interference pattern techniques on photosensitive material **Mermelstein** et al. (WO); and the expected usefulness of employing nonlinear optical techniques for modifying materials in laser patterning techniques was demonstrated by **Neev**, where it is seen to be expected to provide an additional tool for effecting precision of imaging techniques, therefore it would've been obvious at one of ordinary skill in the art to employ such mirror systems, control of contrast in interference patterns &/or nonlinear photosensitive materials for multiphoton induced modifications in photo imaging processes as claimed in the copending application (845), with reasonable expectation of affective processing thereby due to the advantages in processing techniques or optimization enabled by these techniques in sufficiently analogous processes.

Alternatively, the teachings of **Wawro et al.** (7,167,615 B1), or **Hobbs et al**., are applicable to "nonlinear photosensitive material" & resonance transmission, or the alternative obviousness of Hobbs's teachings applied to chirped gratings, respectively, for reasons as discussed above.

This is a provisional obviousness-type double patenting rejection.

13. **Claims 1, 53-54, 57-58, 60-68, 74 & 77-79** are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-15 of U.S. Patent No. **7,018,754 B2** (Stepanov et al.), considering Hobbs et al. as a teaching reference for claim 63, as discussed in section 6 above. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are directed to processes of overlapping scope, where the patent claims employ different semantics, which appear to be a specific species of "creating an irregularity in the interference pattern.... for creating a functional defect..." of the present application, where in the patent that is "writing an extended grading structure", the limitation of variation of the velocity...to vary at least one of phase, amplitude and period properties of at least a portion of the extended grating structure in the photosensitive waveguide" is considered to be encompassed by the present claim language, where the "functional defect" is an "extended defect", which is presumably what makes a "extended grating structure", and the differences in semantics may be considered obvious variations on a theme. Note patent claims 2-5 directed to optics processes that cause beam splitting; claimed seven directed to various modulators, including electro-optic phase modulators, acousto optic frequency shifters, controllable optical retarders, etc.; claims 8-9 directed to utilizing a feedback loop or to improve noise properties; & patent claims 12-14 directed to polarization in the light beams. The differences in phrasing, orders of claiming limitations & variations in scope may be considered obvious variations by one of ordinary skill in the art.

Claims 55-56, 69-70 & 78 or **claims 75-76** or **claims 59 & 75-76** or **claim 63** are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-26 of U.S. Patent No. **7,018,745 B2** (Stepanov et al.), in view of **Mermelstein et al.** (WO) or **Neev**, or **Wawro et al.** (7,167,615 B1), or **Hobbs et al**., respectively, both discussed above.

While the copending patent (745)'s claims do not discuss limitations concerning MEMS's, or pitch &/or contrast in interference patterns, or non-linear photosensitivity in substrate material, the

usefulness of mirror systems consistent with those claimed, or the importance of considering controlling contrast in light interference patterns, were shown as discussed above with respect to employing interference pattern techniques on photosensitive material Mermelstein et al. (WO); and the expected usefulness of employing nonlinear optical techniques for modifying materials in laser patterning techniques was demonstrated by Neev, where it is seen to be expected to provide an additional tool for effecting precision of imaging techniques, therefore it would've been obvious at one of ordinary skill in the art to employ such mirror systems, control of contrast in interference patterns &/or nonlinear photosensitive materials for multiphoton induced modifications in photo imaging processes as claimed in the copending patent (754), with reasonable expectation of affective processing thereby due to the advantages in processing techniques or optimization enabled by these techniques in sufficiently analogous processes.

Alternatively, the teachings of **Wawro et al.** (7,167,615 B1), <u>or</u> **Hobbs et al**., are applicable to "nonlinear photosensitive material" & resonance transmission, or the alternative obviousness of Hobbs's teachings applied to chirped gratings, respectively, for reasons as discussed above.

14. **Claim 59** is alternatively rejected under 35 U.S.C. **103(a)** as being unpatentable over **Stepanov et al.** (WO 99/63371 A1), in view of **Hobbs et al**. (2001/0035991 A1), as applied to claims 1, 53-56, 58, 60-69, 71-74,77 & 79-80 above as appropriate, and further in view of **Chen** (6,108,469).

The discussions of chirped gratings, and diffracted optics have been patterns with varied "pitch", do not appear to have any discussion with respect to the "transmission resonance", however **Chen** (abstract; col. 1, lines 26-59+) teaches the desirability of gratings that have such transmission resonance (e.g. wavelength selective resonant gratings), where gratings can exhibit transmission resonances, when a gap between two sections of a grating provide a phase shift which is not a quarter of a wavelength in length, or $\pi/2$ in phase, hence as the illustrated variation in pitches provided by Hobbs et al. shows progressive grating sections with gaps between, it would've been obvious to one of ordinary skill in the

art that diffractive optics structures with progressively different pitches as shown, or chirped gratings as discussed, would've reasonably been expected to provide suitable structures for the demonstrated useful wavelength selective resonant gratings as discussed by Chen, so as to motivate one of ordinary skill in the art to perform interference patterning as taught by the combination, so as to produce gap dimensions between grating sections in order to create wavelength selective resonance gratings. It is noted that this gap may be considered to read on applicants "linear defect".

15. **Claims 1, 53-54, 58, 60-61, 64-65, 67-68, 71-74 & 79-80** are rejected under 35 U.S.C. **102(b)** as being clearly anticipated by **Mermelstein** (6,140,660).

Mermelstein ((660): abstract; figures, esp. 1-4; summary, esp. col. 1, line 65-col. 2, line 4 & 14-46; col. 3, lines 14-col. 4, line 5 & 47-54, esp. col. 3, lines 18-23 & 35-55; col. 5, line 35-col. 6, line 11; & claims) teaches a process of producing a nonperiodic pattern formed in the region of overlap of interference of a plurality of light beams in response to control signals using modulators (e.g. acousto-optic modulators) to control intensity, phase, amplitude & polarization of the light beams, where the plural beams may be supplied by splitting a beam from a single source & where apertures or "apodizing" element may be employed to limit the region of beam overlap (a form of shaping beams). This technique may be employed to expose a photoresist (either positive or negative) on a wafer where the exposure causes the photoresist material to react so that the exposed portions are either more or less susceptible to subsequent processing. It is taught that multiple exposures on a photoresist may be performed, where the initial intensity and phase of the radiation beams are changed by controller for the next exposure which forms a new interference pattern, so as to construct a desired exposure patterns out of a number of "basic or primitive interference patterns". Mermelstein (660) teach that a calibrating step for the interference pattern may be performed prior to forming the nonperiodic pattern, or **calibration** may be performed **during** the nonperiodic pattern formation (considered equivalent of a feedback correction, that achieves desirable pattering characteristics in the produced structure). Note that changing from one interference

pattern to another in the sequential exposures may be considered to be "creating an irregularity in the interference pattern by controlling the wavefront of at least one of the beams", since the interference pattern is changed by employing the controller, which is considered to read on the claimed adaptive optics devices & which affects the beams, and it may certainly be considered that such sequential interference pattern exposure creates defects in the previously form structures, which since are desired for the final results are functional.

Mermelstein discusses rotation & translation with respect to producing desired shapes via the various projections (col. 3, line 63-col. 4, line 5+) & discusses that the systems as represented in figures 1 & 7 provide for rotation & translation of the wafer (col. 5 lines 53-57), thus suggesting movement of some portion of the "adaptive optics" &/or the substrate during this sequential interference patterns applications in order to achieve desired patterning.

Note inclusion of limitations including "extended photo-induced structure", since "extended" cannot be determined to provide any clear meaning to the structure produced.

While Mermelstein (660) could be analogously combined in one of three rejections to cover other claims, such rejections are redundant at this time.

16. **Other art** of interest to patterning photosensitive material using interference patterns includes: Belmonte et al. (2003/0059165 A1), Miller et al. (6,297,894 B1) & Cowan et al. (4,402,571).

17. **Any inquiry** concerning this communication or earlier communications from the examiner should be directed to **Marianne L. Padgett** whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 9:00 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Marianne L. Padgett/
Primary Examiner, Art Unit 1792

MLP/dictation software

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